MATHS

BOOKS - RD SHARMA MATHS (HINGLISH)

TRIGONOMETRIC RATIOS OF MULTIPLE AND SUBMULTIPLE ANGLES

Solved Examples And Exercises

1. If $5\sin\alpha = 3\sin(\alpha + 2\beta) \neq 0,$ then $\tan(\alpha + \beta)$ is equal to

Watch Video Solution

2. If $\tan\theta = \frac{a}{b}$,then $b\cos 2\theta + a\sin 2\theta$ is equal to (a) a (b) b (c) $\frac{a}{b}$ (d) $\frac{b}{a}$

Watch Video Solution

3. Prove that: $\cos^2 A + \cos^2\left(A + \frac{2\pi}{3}\right) + \cos^2\left(A - \frac{2\pi}{3}\right) = \frac{3}{2}$

Watch Video Solution

4. If $2\tan\alpha = 3tan\beta, then\, \tan(\alpha - \beta) =$ $(a)\, \frac{\sin 2\beta}{5 - \cos 2\beta}$ (b) $\frac{\cos 2\beta}{5 - \cos 2\beta}$ (c) $\frac{\sin 2\beta}{5 + \cos 2\beta}$ (d) none of these

Watch Video Solution

5. Prove that: $\sin^2 24^\circ - \sin^2 6^\circ = \frac{\sqrt{5} - 1}{8}$

Watch Video Solution

6. What is the value of $\cos 36^\circ$.

A. $\frac{\sqrt{5} + 1}{4}$.

B. $\frac{\sqrt{5} - 1}{4}$.

C. $\frac{\sqrt{5}+1}{2}$.

D. None of these

Answer: A

Watch Video Solution

7. Prove that: $\sin^2 24^0 - \sin^2 6^0 = \frac{\sqrt{5}-1}{8}$

Watch Video Solution

8. Prove that: $\cos 18^0 = \frac{\sqrt{10+2\sqrt{5}}}{4}$.

Watch Video Solution

9. If $tan\frac{\theta}{2} = \sqrt{\frac{1-e}{1+e}}\tan\left(\frac{\alpha}{2}\right)$, then $\cos\alpha =$

(a) $1 - e\cos(\cos\theta + e)$

(b) $\frac{1+e\cos\theta}{\cos\theta-e}$

(c) $\frac{1-e\cos\theta}{\cos\theta-e}$

(d) $\frac{\cos\theta-e}{1-e\cos\theta}$

Watch Video Solution

10. If $\cos 2x + 2\cos x = 1 then, \left(2-\cos^2 x\right)\sin^2 x$ is equal to

Watch Video Solution

11. If $\alpha and \beta$ are acute angles satisfying $\cos 2\alpha = \frac{3\cos 2\beta - 1}{3-\cos 2\beta}, then \tan\alpha =$ $\sqrt{2}\tan\beta$ (b) $\frac{1}{\sqrt{2}} tan\beta$ (c) $\sqrt{2}\cot\beta$ (d) $\frac{1}{\sqrt{2}}\cot\beta$

Watch Video Solution

12. Prove that: $\cos^2 A + \cos^2\left(A+\frac{\pi}{3}\right) + \cos^2\left(A-\frac{\pi}{3}\right) = \frac{3}{2}$

Watch Video Solution

13. Prove that:

$$\cos^2 48^\circ - \sin^2 12^\circ = \frac{\sqrt{5}+1}{8}$$

Watch Video Solution

14. The value of $\frac{\sin 5\alpha - \sin 3\alpha}{\cos 5\alpha + 2\cos 4\alpha + \cos 3\alpha}$ is

Watch Video Solution

15. If $\cos\theta = \frac{1}{2}\left(a + \frac{1}{a}\right), \cos 3\theta = \lambda\left(a^3 + \frac{1}{a^3}\right), then\lambda =$ (a) $-\frac{1}{4}$ (b) $\frac{1}{4}$ (c) 1 (d) none of these

Watch Video Solution

16. Prove that: $tanA + \tan\left(60^0 + A\right) - tan\left(60^0 - A\right) = 3tan3A$

Watch Video Solution

17. If $tan^2\theta = 2\tan^2\phi + 1$, prove that $\cos 2\theta + \sin^2\phi = 0$.

Watch Video Solution

18. If $\theta = \dfrac{\pi}{2^n + 1}$, prove that: $2^n \cos\theta \cos 2\theta \cos 2^2 \cos 2^{n-1}\theta = 1$.

Watch Video Solution

19. Prove that: $\cot A + \cot\left(60^0 + A\right) - \cot\left(60^0 - A\right) = 3\cot 3A$

Watch Video Solution

20. Prove that: $\cos^2 48^0 - \sin^2 12^0 = \dfrac{\sqrt{5}+1}{8}$

Watch Video Solution

21. Find $\sin\frac{x}{2}$, $\cos\frac{x}{2}$ and $\tan\frac{x}{2}$ of the following : $\tan x = -\frac{4}{3}$, x in quadrant II

Watch Video Solution

22. Find the values of $\frac{\cos\pi}{8}$

Watch Video Solution

23. Prove that:

$$\sin\left(\frac{\pi}{14}\right)\sin\left(\frac{3\pi}{14}\right)\sin\left(\frac{5\pi}{14}\right)\sin\left(\frac{7\pi}{14}\right)\sin\left(\frac{9\pi}{14}\right)\sin\left(\frac{11\pi}{14}\right)\sin\left(\frac{13\pi}{14}\right) =$$

Watch Video Solution

24. Prove that:

$$(1+\sec 2\theta)(1+\sec 4\theta)(1+\sec 8\theta)(1+\sec 2^n\theta) = tan2^n\theta\cot\theta, n \in N.$$

Watch Video Solution

25. If $\theta = \frac{\pi}{2^n + 1}$, prove that: $2^n \cos\theta \cos 2\theta \cos 2^2 \cos 2^{n-1}\theta = 1.$

Watch Video Solution

26. Prove that: $\cos\left(\frac{\pi}{7}\right)\cos\left(\frac{2\pi}{7}\right)\cos\left(\frac{4\pi}{7}\right) = -\frac{1}{8},$

Watch Video Solution

27. If α and β are distict roots of $a\cos\theta + b\sin\theta = c,$ prove that $\sin(\alpha + \beta) = \frac{2ab}{a^2 + b^2}$

Watch Video Solution

28. $\sin^2\left(\frac{A}{2} + \frac{\pi}{8}\right) - \sin^2\left(\frac{A}{2} - \frac{\pi}{8}\right) = \frac{1}{\sqrt{2}}\sin A$

Watch Video Solution

29. $\sin 4A = 4\cos^3 A \sin A - 4\sin^3 A \cos A$

Watch Video Solution

30. If $\tan A = \frac{1}{7} and tan B = \frac{1}{3}$, show that $\cos 2A = \sin 4B$.

Watch Video Solution

31. If $2tan\frac{\alpha}{2} = \tan\left(\frac{\beta}{2}\right)$, prove that $\cos\alpha = \frac{3+5\cos\beta}{5+3\cos\beta}$

Watch Video Solution

32. If $a\cos 2\theta + b\sin 2\theta = c has \alpha and \beta$ as its roots, then prove that $\tan\alpha + tan\beta = \frac{2ab}{a+c}$ $\tan\alpha + tan\beta = \frac{c-a}{c+a}$ $\tan(\alpha+\beta) = \frac{b}{a}$

Watch Video Solution

33. If $\cos\alpha + \cos\beta = 0 = \sin\alpha + \sin\beta$, then prove that $\cos 2\alpha + \cos 2\beta = -2\cos(\alpha + \beta)$.

Watch Video Solution

34. Prove that: $\sin\left(\frac{\pi}{5}\right)\sin\left(\frac{2\pi}{5}\right)\sin\left(\frac{3\pi}{5}\right)\sin\left(\frac{4\pi}{5}\right) = \frac{5}{16}$

Watch Video Solution

35. $\sin 5\theta =$

Watch Video Solution

36. Prove that: $\sin^4\left(\frac{\pi}{8}\right) + \sin^4\left(\frac{3\pi}{8}\right) + \sin^4\left(\frac{5\pi}{8}\right) + \sin^4\left(\frac{7\pi}{8}\right) = \frac{3}{2}$

Watch Video Solution

37. Prove that:$\tan 6^0 \tan 42^0 \tan 66^0 \tan 78^0 = 1$.

Watch Video Solution

38. If $\tan\alpha = \frac{1-\cos\beta}{\sin\beta}$, *then* a)$\tan 3\alpha = \tan 2\beta$ (b) $\tan 2\alpha = \tan\beta$ (c) $\tan 2\beta = \tan\alpha$ (d) none of these

Watch Video Solution

39. Prove that: $\sin 36^0 = \frac{\sqrt{10-2\sqrt{5}}}{4}$.

Watch Video Solution

40. The value of $\frac{\cos 3\theta}{2\cos 2\theta - 1}$ is equal to $\cos\theta$ (b) $\sin\theta$ (c) $\tan\theta$ (d) none of these

Watch Video Solution

41. The value of $\cos^4\theta + \sin^4\theta - 6\cos^2\theta$ is $\cos 2\theta$ (b) $s \in 2\theta$ (c) $\cos 4\theta$ (d) none of these

Watch Video Solution

42. Prove that: $\frac{\sin\pi}{10} + \frac{\sin(13\pi)}{10} = -\frac{1}{2}$

Watch Video Solution

43. If $\tan(\pi/4+\theta) + \tan(\pi/4-\theta) = \lambda\sec 2\theta$, *them* 3 (b) 4 (c) 1 (d)2

Watch Video Solution

44. Prove that: $\frac{1+\cos 4x}{\cot x - \tan x} = \frac{1}{2}\sin 4x$

Watch Video Solution

45. Prove that: $\frac{\cos 7x - \cos 8x}{1 + 2\cos 5x} = \cos 2x - \cos 3x$

Watch Video Solution

46. To prove $\frac{\cos 5x + \cos 4x}{1 - 2\cos 3x} = -\cos 2x - \cos x$

Watch Video Solution

47. If $\tan\theta = tthentan2\theta + \sec 2\theta$ is equal to $\frac{1+t}{1-t}$ (b) $\frac{1-t}{1+t}$ (c) $\frac{2t}{1-t}$ (d) $\frac{2t}{1+t}$

Watch Video Solution

48. Prove that: $\cot\frac{\pi}{24} = \sqrt{2} + \sqrt{3} + \sqrt{4} + \sqrt{6}$

Watch Video Solution

49. $\frac{\sec 8A - 1}{\sec 4A - 1}$ is equal to (A) $\frac{\tan 2A}{\tan 8A}$ (B) $\frac{\tan 8A}{\tan 2A}$ (C) $\frac{\cot 8A}{\cot 2A}$ (D) none of these

Watch Video Solution

50. If $A - 2\sin^2\theta - \cos 2\theta, then A$ lies in the interval $[-1, 3]$ (b) $[1, 2]$ (c) $[-2, 4]$ (d) none of these

Watch Video Solution

51. Prove that $\frac{\tan 3x}{\tan x}$ never lies between $\frac{1}{3} and 3$.

Watch Video Solution

52. The value of $\left(\cot\left(\frac{x}{2}\right) - tan\frac{x}{2}\right)^2(1 - 2\tan x \cot 2x)$ is 1 (b) 2 (c) 3 (d) 4

Watch Video Solution

53. Prove that $\cos^3 A + \cos^3(120^0 + A) + \cos^3(240^0 + A) = \frac{3}{4}\cos 3A$

Watch Video Solution

54. Simplify $2\sin^2\beta + 4\cos(\alpha+\beta)\sin\alpha\sin\beta + \cos 2(\alpha+\beta)$

Watch Video Solution

55. Prove that: $\tan\frac{\pi}{16} = \sqrt{4+2\sqrt{2}} - (\sqrt{2}+1)$

Watch Video Solution

56. Prove that $\tan 7\frac{1^\circ}{2} = \sqrt{6} - \sqrt{3} + \sqrt{2} - 2.$

Watch Video Solution

57. Prove that: $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$

Watch Video Solution

58. Prove that: $(\cos A + \cos B)^2 + (\sin A - \sin B)^2 = 4\cos^2\left(\frac{A+B}{2}\right)$

.

Watch Video Solution

59. Prove that:

$$\left(1 + \frac{\cos \pi}{8}\right)\left(1 + \frac{\cos(3\pi)}{8}\right)\left(1 + \frac{\cos(5\pi)}{8}\right)\left(1 + \frac{\cos(7\pi)}{8}\right) = \frac{1}{8}$$

Watch Video Solution

60. If $\sin A = \frac{3}{5}$, where $0^0 < A < 90^0$, then find the values of $\sin 2A, \cos 2A, \tan 2A$ and $\sin 4A$

Watch Video Solution

61. Find the value of $\sin\left(\frac{\pi}{10}\right)\sin\left(\frac{13\pi}{10}\right)$

A.

$$-\frac{1}{4}$$

B.

$$\frac{1}{4}$$

C.

$$-\frac{1}{2}$$

D. None of these

Answer: A

Watch Video Solution

62. `Show that: sqrt(2+sqrt(2+sqrt(2+2cos8theta)))=2costheta,0 `

Watch Video Solution

63. If $\tan\alpha = \frac{1}{7}, \sin\beta = \frac{1}{\sqrt{10}}$, prove that$\alpha + 2\beta = \frac{\pi}{4}$, where `0

Watch Video Solution

64. If $\tan\left(\frac{\pi}{4} + \frac{\theta}{2}\right) = \tan^3\left(\frac{\pi}{4} + \frac{\alpha}{2}\right)$ then $\sin(\theta) = \frac{\sin(\alpha)\left(3 + \sin^2(\alpha)\right)}{1 + 3\sin^2(\alpha)}$

Watch Video Solution

65. If $\sin(\theta + \alpha) = a and \sin(\theta + \beta) = b,$ prove that $\cos 2(\alpha - \beta) - 4ab\cos(\alpha - \beta) = 1 - 2a^2 - 2b^2$

Watch Video Solution

66. Prove that: $tan\alpha + 2\tan 2\alpha + 4\tan 4\alpha + 8\cot 8\alpha = \cot\alpha$

Watch Video Solution

67. If $tan\alpha = \frac{p}{q}$, where $\alpha = 6\beta, \alpha$ being acute angle, prove that $\frac{1}{2}\{p\cos ec2\beta - q\sec 2\beta\} = \sqrt{p^2 + q^2}$

Watch Video Solution

68. If $\cos\theta = \cos\alpha\cos\beta$, prove that $tan\frac{\theta+\alpha}{2}tan\frac{\theta-\alpha}{2} = tan^2\frac{\beta}{2}$.

Watch Video Solution

69. If $tan\frac{\theta}{2} = \sqrt{\frac{a-b}{a+b}}\frac{\tan\varphi}{2}$, prove that $\cos\theta = \frac{a\cos\varphi + b}{a + b\cos\varphi}$.

Watch Video Solution

70. Prove that:

$$\frac{2\cos 2^n\theta + 1}{2\cos\theta + 1} = (2\cos\theta - 1)(2\cos 2\theta - 1)\left(2\cos 2^2\theta - 1\right)\ldots\left(2\cos 2^{n-1}\theta - 1\right.$$

Watch Video Solution

71. If $tan\frac{\theta}{2} = \sqrt{\frac{a-b}{a+b}}\frac{\tan\varphi}{2}$, prove that $\cos\theta = \frac{a\cos\varphi + b}{a + b\cos\phi}$.

Watch Video Solution

72. Prove that: $\sin 3e \sin^3 e + \cos 3e \cos^3 e = \cos^3 2e$

Watch Video Solution

73. If $\cos\alpha + \cos\beta + \cos\gamma = 0$, then prove that $\cos 3\alpha + \cos 3\beta + \cos 3\gamma = 12\cos\alpha\cos\beta\cos\gamma$

Watch Video Solution

74. If $\cos\theta = \frac{\cos\alpha - \cos\beta}{1 - \sin\alpha\sin\beta}$, prove that one value of $tan\frac{\theta}{2} = \frac{tan\frac{\alpha}{2} - tan\frac{\beta}{2}}{1 - tan\frac{\alpha}{2} - tan\frac{\beta}{2}}$

Watch Video Solution

75. If $\cos\theta = \frac{\cos\alpha - \cos\beta}{1 - \cos\alpha.\cos\beta}$, prove that $tan\frac{\theta}{2} = \pm\tan\left(\frac{\alpha}{2}\right)\cot\left(\frac{\beta}{2}\right)$.

Watch Video Solution

76. $\sin 5A = 5\cos^4 A\sin A - 10\cos^2 A\sin^3 A + \sin^5 A$

Watch Video Solution

77. Prove that: $\cos 5A = 16\cos^5 A - 20\cos^3 A + 5\cos A$

Watch Video Solution

78. Prove that: $\sin 18^\circ = \frac{\sqrt{5}-1}{4}$.

Watch Video Solution

79. Prove that: $|\sin\theta\sin(60-\theta)\sin(60+\theta)| \leq \frac{1}{4}$ for all values of θ.

Watch Video Solution

80. Prove that: $\frac{\sin 2\theta}{1+\cos 2\theta+\sin\theta} = tan\theta$

Watch Video Solution

81. Prove that $\frac{\sin(2\theta)}{1-\cos 2\theta} = \cot\theta$

Watch Video Solution

82. Prove that: $\frac{\cos 2\theta}{1+\sin 2\theta} = \tan\left(\frac{\pi}{4}-\theta\right)$

Watch Video Solution

83. Prove that: $\frac{1+\sin 2\theta+\cos 2\theta}{1+\sin 2\theta-\cos 2\theta}=\cot\theta$

Watch Video Solution

84. Prove that: $\frac{1+\sin\theta-\cos\theta}{1+\sin\theta+\cos\theta}=\tan\left(\frac{\theta}{2}\right)$

Watch Video Solution

85. Prove that: $\frac{\cos\theta}{1+\sin\theta}=\tan\left(\frac{\pi}{4}-\frac{\theta}{2}\right)$

Watch Video Solution

86. Prove that: $\sin 10^0\sin 30^0\sin 50^0\sin 70^0=\frac{1}{16}$.

Watch Video Solution

87. $\cos 4x=1-8\sin^2 x\cos^2 x$

Watch Video Solution

88. Prove that: $\frac{\sin 5x - 2\sin 3x + \sin x}{\cos 5x - \cos x} = \tan x$

Watch Video Solution

89. $\frac{\sin x - \sin 3x}{\sin^2 x - \cos^2 x} = 2\sin x$

Watch Video Solution

90. Express each of the following as the sum or difference of sines and cosines: $2\sin 4\theta \sin 3\theta$

Watch Video Solution

91. Show that $\sqrt{3}\cos ec\, 20^0 - \sec 20^0 = 4.$

Watch Video Solution

92. Prove that: $\tan 4\theta = \frac{4tan\theta(1-\tan^2\theta)}{1-6\tan^2\theta+\tan^4\theta}$

Watch Video Solution

93. If `tanx=3/4,pi

Watch Video Solution

94. Find : $\cos 20^0 \cos 40^0 \cos 60^0 \cos 80^0$

A. 1/16

B. 1/8

C. 1/2

D. None of these

Answer: A

Watch Video Solution

95. Prove that : $\cos\left(\frac{\pi}{7}\right)\cos\left(\frac{2\pi}{7}\right)\cos\left(\frac{3\pi}{7}\right) = \frac{1}{8}$

Watch Video Solution

96. Show that: $\sin 50^0 \cos 85^0 = \frac{1-\sqrt{2}\sin 35^0}{2\sqrt{2}}$

Watch Video Solution

97. Prove that $\cos\left(2\frac{\pi}{15}\right)\cos\left(4\frac{\pi}{15}\right)\cos\left(8\frac{\pi}{15}\right)\cos\left(14\frac{\pi}{15}\right) = \frac{1}{16}$

Watch Video Solution

98. $\sin\left(\frac{\pi}{18}\right)\cdot\sin\left(5\frac{\pi}{18}\right)\cdot\sin\left(7\frac{\pi}{18}\right)$

Watch Video Solution

99.

$$\cos\left(\frac{\pi}{15}\right)\cos\left(\frac{2\pi}{15}\right)\cos\left(\frac{3\pi}{15}\right)\cos\left(\frac{4\pi}{15}\right)\cos\left(\frac{5\pi}{15}\right)\cos\left(\frac{6\pi}{15}\right)\cos\left(\frac{7\pi}{15}\right) = \frac{1}{2^7}$$

Watch Video Solution

100. If $\sin\alpha + \sin\beta = a$ and $\cos\alpha + \cos\beta = b$ prove that: $\cos(\alpha - \beta) = \left(\frac{a^2 + b^2 - 2}{2}\right)$

Watch Video Solution

101. $\sin\alpha + \sin\beta = a, \cos\alpha + \cos\beta = b \Rightarrow \sin(\alpha + \beta)$

Watch Video Solution

102. Prove that $\sqrt{\frac{1 - \cos 2\theta}{1 + \cos 2\theta}} = \tan\theta$ where $\tan\theta > 0$

Watch Video Solution

103. Prove that: $\frac{\sin 2\theta}{1-\cos 2\theta} = \cot\theta$

Watch Video Solution

104. Prove that: $\frac{\sin 2\theta}{1+\cos 2\theta} = tan\theta$

Watch Video Solution

105. Prove that: $\sqrt{2+\sqrt{2+2\cos 4\theta}} = 2\cos\theta$

Watch Video Solution

106. $\frac{1+\sin 2\theta-\cos 2\theta}{1+\sin 2\theta+\cos 2\theta} = \tan\theta$

Watch Video Solution

107. $\frac{\sin\theta + \sin 2\theta}{1 + \cos\theta + \cos 2\theta} = \tan\theta$

Watch Video Solution

108. Prove that: $\frac{\cos 2\theta}{1 + \sin 2\theta} = \tan\left(\frac{\pi}{4} - \theta\right)$

Watch Video Solution

109. Prove that: $\frac{\cos\theta}{1 + \sin\theta} = \tan\left(\frac{\pi}{4} - \frac{\theta}{2}\right)$

Watch Video Solution

110. Prove that: $\sin^2\left(\frac{\pi}{8}\right) + \sin^2\left(\frac{3\pi}{8}\right) + \sin^2\left(\frac{5\pi}{8}\right) + \sin^2\left(\frac{7\pi}{8}\right) = 2$

Watch Video Solution

111. Prove that:

$$(\cos\alpha+\cos\beta)^2+(s\in\alpha+s\in\beta)^2=4\cos^2\left(\frac{\alpha-\beta}{2}\right)$$

Watch Video Solution

112. Prove that: $1+\cos^2 2x=2\left(\cos^4 x+\sin^4 x\right)$

Watch Video Solution

113. $\cos^3 2\theta+3\cos 2\theta=4\left(\cos^6\theta-\sin^6\theta\right)$

Watch Video Solution

114. Prove that : $(\sin 3A+\sin A)\sin A+(\cos 3A-\cos A)\cos A=0$

Watch Video Solution

115. Prove that:$\cos^2\left(\frac{\pi}{4}-\theta\right)-\sin^2\left(\frac{\pi}{4}-\theta\right)=s\in 2\theta$

Watch Video Solution

116. Prove that: $\cos 4A = 1 - 8\cos^2 A + 8\cos^4 A$

Watch Video Solution

117. Prove that

$3(\sin x - \cos x)^4 + 4(\sin^6 x + \cos^6 x) + 6(\sin x + \cos x)^2 = 13$

Watch Video Solution

118. $\cos^6 A - \sin^6 A = \cos 2A\left(1 - \frac{1}{4}\sin^2 2A\right)$

Watch Video Solution

119. Prove that: $\tan\left(\frac{\pi}{4}+\theta\right)+\tan\left(\frac{\pi}{4}-\theta\right)=2\sec 2\theta$.

Watch Video Solution

120. Prove that: $\cot^2 A-\tan^2 A=4\cot 2A\cos ec2A$

Watch Video Solution

121. $\sin 4A=4\sin A\cos^3 A-4\cos A\sin^3 A$

Watch Video Solution

122. Prove that: $s\in 3x+s\in 2x-s\in x=4s\in x\frac{\cos x}{2}\frac{\cos(3x)}{2}$

Watch Video Solution

123. If $\cos x = -\frac{3}{5} and\ x$ lies in the IIIrd quadrant, find the values of $\frac{\cos x}{2}, \frac{\sin x}{2} and\ s \in 2x.$

Watch Video Solution

124. If $\cos x = -\frac{3}{5} and\ x$ lies in IIInd quadrant, find the values of $\sin 2x\ and \sin\left(\frac{x}{2}\right).$

Watch Video Solution

125. If $\sin x = \frac{\sqrt{5}}{3} and\ x$ lies in IInd quadrant, find the values of $\frac{\cos x}{2}, \frac{\sin x}{2} and tan\frac{x}{2}.$

Watch Video Solution

126. Prove that $1 + \cos^2 2x = 2\left(\cos^4 x + \sin^4 x\right)$

Watch Video Solution

127. If $\cos\theta = \frac{4}{5}$ and θ is acute, find the $\tan 2\theta$

Watch Video Solution

128. If $\sin x = \frac{4}{5}$ and $0 < x < \frac{\pi}{2}$, find the value of $\sin 4x$

Watch Video Solution

129. Prove that: $\cos 7^0 \cos 14^0 \cos 28^0 \cos 56^0 = \frac{s \in 68^0}{16\cos 83^0}$

Watch Video Solution

130. Prove that: $\cos\left(\frac{\pi}{5}\right)\cos\left(\frac{2\pi}{5}\right)\cos\left(\frac{4\pi}{5}\right)\cos\left(\frac{8\pi}{5}\right) = \frac{-1}{16}$

Watch Video Solution

131. $\cos\left(\frac{2\pi}{65}\right)\cos\left(\frac{4\pi}{65}\right)\cos\left(\frac{8\pi}{65}\right)\cos\left(\frac{16\pi}{65}\right) = \frac{1}{16}$

Watch Video Solution

132. If $2\,tan\alpha = 3tan\beta$, prove that $\tan(\alpha - \beta) = \frac{\sin 2\beta}{5 - \cos 2\beta}$

Watch Video Solution

133. $\sin\alpha + \sin\beta = a, \cos\alpha + \cos\beta = b \Rightarrow \sin(\alpha + \beta)$

Watch Video Solution

134. If $\sin\alpha + \sin\beta = a$ and $\cos\alpha + \cos\beta = b$ prove that: $\cos(\alpha - \beta) = \left(\frac{a^2 + b^2 - 2}{2}\right)$

Watch Video Solution

135. If $\cos\theta = \frac{\cos\alpha + \cos\beta}{1 + \cos\alpha\cos\beta}$, prove that $\frac{\tan\theta}{2} = = -\frac{\tan\alpha}{2}\frac{\tan\beta}{2}$

Watch Video Solution

136. If $\sec(\theta+\alpha) + \sec(\theta-\alpha) = 2\,sec\theta$, prove that $\cos\theta = \pm\sqrt{2}\frac{\cos\alpha}{2}$.

Watch Video Solution

137. If $\cos\alpha = \frac{4}{5}$ and $\cos\beta = \frac{5}{13}$, prove that $\cos(\alpha-\beta) = \frac{56}{65}$

Watch Video Solution

138. Prove that: $8\frac{\cos^3\pi}{9} - 6\frac{\cos\pi}{9} = 1.$

Watch Video Solution

139. Prove that: $108\frac{\sin\pi}{18} - 144\frac{\sin^3\pi}{18} = 18$

Watch Video Solution

140. Prove that $\cos 6x = 32\cos^6 x - 48\cos^4 x + 18\cos^2 x - 1$

Watch Video Solution

141. Prove that : $\cos A\cos(60-A)\cos(60+A) = \frac{1}{4}\cos 3A$

Watch Video Solution

142. Prove that: $\sin A\sin(60-A)\sin(60+A) = \frac{1}{4}\sin 3A\cdot$

Watch Video Solution

143. Prove that: $\sin 20^0\sin 40^0\sin 60^0\sin 80^0 = \frac{3}{16}$

Watch Video Solution

144. prove $\sin(5\theta) = 16\sin^5(\theta) - 20\sin^3(\theta) + 5\sin(\theta)$

Watch Video Solution

145. Prove the following identity:

$4\left(\cos^3 10^0 + \sin^3 20^0\right) = 3\left(\cos 10^0 + \sin 20^0\right)$

Watch Video Solution

146. Prove the following identity: $\cos^3\theta s \in 3\theta + \sin^3\theta\cos 3\theta = \frac{3}{4}s \in 4\theta$.

Watch Video Solution

147. Prove the following identity:

$\tan\theta\tan(60^\circ + \theta)\tan(60^\circ - \theta) =]\tan 3\theta$ and $hence\tan 20^\circ\tan 40^\circ\tan 60^\circ$

Watch Video Solution

148. Prove that: $tanA + \tan\left(60^0 + A\right) - tan\left(60^0 - A\right) = 3tan3A$Let's use the sum-of-angles formula for tangent,

$\tan(x + y) = \dfrac{\tan x + \tan y}{1 - \tan x \tan y}$, along with $\tan 60^\circ = \sqrt{3}$

$$\tan\left(60^\circ \pm A\right) = \frac{\sqrt{3} \pm \tan A}{1 \mp \left(\sqrt{3}\right)\tan A}$$

$$= \left(1 \pm \left(\sqrt{3}\right)\tan A\right)\frac{\sqrt{3} \pm \tan A}{1 - 3\tan^2 A}$$

$$= \frac{3 \pm 4\tan A + \left(\sqrt{3}\right)\tan^2 A}{1 - 3\tan^2 A}$$

$$\tan A + \tan\left(60^\circ + A\right) - \tan\left(60^\circ - A\right)$$

$$= \tan A + 8\frac{\tan A}{1 - 3\tan^2 A}$$

$$= \tan A\frac{1 - 3\tan^2 A + 8}{1 - 3\tan^2 A}$$

$$= 3\tan A \frac{3 - \tan^2 A}{1 - 3\tan^2 A}$$

$$\tan 2A = 2\frac{\tan A}{1 - \tan^2 A}$$

$$\tan 3A = \tan(2A + A)$$

$$= \frac{\tan 2A + \tan A}{1 - \tan 2A \tan A}$$

$$= \frac{2\tan A + \tan A\left(1 - \tan^2 A\right)}{\left(1 - \tan^2 A\right) - 2\tan A \tan A}$$

$$= \tan A\left(3 - \tan^2 A\right) \frac{)}{1 - 3\tan^2 A}$$

Watch Video Solution

149. Prove that: $\cot A + \cot\left(60^0 + A\right) - \cot\left(60^0 - A\right) = 3\cot 3A$

Watch Video Solution

150. Prove the following identity:

$$\cot A + \cot\left(60^0 + A\right) + \cot\left(120^0 + A\right) = 3\cot 3A$$

Watch Video Solution

151. Prove that:

$$\sin^3 A + \sin^3\left(\frac{2\pi}{3} + A\right) + \sin^3\left(\frac{4\pi}{3} + A\right) = -\frac{3}{4}\sin 3A.$$

Watch Video Solution

152. Maximum value of $\left|\cos\theta\cos\left(60^0 - \theta\right)\cos\left(60^0 + \theta\right)\right.$ for all values of θ.

A. 1/2

B. 1/4

C. 1/8

D. None of these

Answer: B

Watch Video Solution

153. Prove that: $\sin\left(\frac{\pi}{5}\right)\sin\left(2\frac{\pi}{5}\right)\sin\left(3\frac{\pi}{5}\right)\sin\left(4\frac{\pi}{5}\right) = \frac{5}{16}$

Watch Video Solution

154. Prove that $\frac{\cos(2\pi)}{15}\frac{\cos(4\pi)}{15}\frac{\cos(8\pi)}{15}\frac{\cos(14\pi)}{15} = \frac{1}{16}$

Watch Video Solution

155. Prove that: $\sin 12^0 \sin 48^0 \sin 54^0 = \frac{1}{8}.$

Watch Video Solution

156. The value oif the expressin $\left(1+\frac{\cos\pi}{10}\right)\left(1+\frac{\cos(3\pi)}{10}\right)\left(1+\frac{\cos(7\pi)}{10}\right)\left(1+\frac{\cos(9\pi)}{10}\right)$ is

Watch Video Solution

157. Prove that ; $4\sin 27^\circ = (5+\sqrt{5}) - \sqrt{(3-\sqrt{5})}$ we have

Watch Video Solution

158. Prove that : $\sin^2(72^\circ) - \sin^2(60^\circ) = \frac{\sqrt{5}-1}{8}$

Watch Video Solution

159. Prove that: $\sin^2 24^0 - \sin^2 6^0 = \frac{\sqrt{5}-1}{8}$

Watch Video Solution

160. Prove that: $\sin^2 42^0 - \cos^2 78^0 = \frac{\sqrt{5}+1}{8}$

Watch Video Solution

161. Prove that: $\cos 78^0 \cos 42^0 \cos 36^0 = \frac{1}{8}$

Watch Video Solution

162.

$\cos\left(\frac{\pi}{15}\right)\cos\left(\frac{2\pi}{15}\right)\cos\left(\frac{3\pi}{15}\right)\cos\left(\frac{4\pi}{15}\right)\cos\left(\frac{5\pi}{15}\right)\cos\left(\frac{6\pi}{15}\right)\cos\left(\frac{7\pi}{15}\right) = \frac{1}{2^7}$

Watch Video Solution

163. Prove that $\cos 6^\circ . \cos 42^\circ . \cos 66^\circ \cos 78^\circ = \frac{1}{16}$

Watch Video Solution

164. Prove that: $\sin 6^0 \sin 42^0 \sin 66^0 \sin 78^0 = \frac{1}{16}$

Watch Video Solution

165. Prove that: $\sin 36^0 s \in 72^0 s \in 108^0 s \in 144^0 = \frac{5}{16}$.

Watch Video Solution

166. If $\cos 4x = 1 + k \sin^2 x \cos^2 x$, then write the value of k.

Watch Video Solution

167. If $\frac{\tan x}{2} = \frac{m}{n}$, then writhe the value f $m \sin x + n \cos x$.

Watch Video Solution

168. If `pi/2

Watch Video Solution

169. If `pi/2

Watch Video Solution

170. If `pi/2

Watch Video Solution

171. If `pi

Watch Video Solution

172. Write the value of $\cos^2 76^\circ + \cos^2 16^\circ - \cos 76^\circ \cos 16^\circ$

Watch Video Solution

173. If `pi/4

Watch Video Solution

174. Prove that: $\frac{\cos\pi}{7}\frac{\cos(2\pi)}{7}\frac{\cos(4\pi)}{7} = -\frac{1}{8}$,

Watch Video Solution

175. If $\sin x + \cos x = a$, find the value of $\sin^6 x + \cos^6 x$.

Watch Video Solution

176. If $s \in x + \cos x = a$, find the value of $|s \in x - \cos x|$.

Watch Video Solution

177. $8.\ \sin\left(\frac{x}{8}\right).\cos\left(\frac{x}{2}\right).\cos\left(\frac{x}{4}\right).\cos\left(\frac{x}{8}\right) =$

Watch Video Solution

178.

$$\cos\left(\frac{\pi}{65}\right)\cos\left(\frac{2\pi}{65}\right)\cos\left(\frac{4\pi}{65}\right)\cos\left(\frac{8\pi}{65}\right)\cos\left(\frac{16\pi}{65}\right)\cos\left(\frac{32\pi}{65}\right)=\frac{1}{64}$$

Watch Video Solution

179. For all real values of x, $\cot x - 2\cot 2x$

is equal to a.$\tan 2x$ b. $tanx$ c. $\cot 3x$ d. none of these

Watch Video Solution

180. The value of $2\frac{\tan\pi}{10}+3\frac{\sec\pi}{10}-4\frac{\cos\pi}{10}$ is 0 b. 1 c. $\sqrt{5}$ d. none of these

Watch Video Solution

181. If in a $\Delta ABC, \tan A + \tan B + \tan C = 0$ then $\cot A \cot B \cot C =$ $a.6, b.\ 1, c.\ \frac{1}{6}, d.$ none of these

Watch Video Solution

182. If $s \in \alpha + s \in \beta = a\ and \cos\alpha - \cos\beta = b,$ then $\frac{\tan(\alpha - \beta)}{2} =$ $-\frac{a}{b}$ b. $\frac{b}{a}$ c. $\sqrt{a^2 + b^2}$ d. none of these

Watch Video Solution

183. The value of $tan\theta \sin\left(\frac{\pi}{2} + \theta\right)\cos\left(\frac{\pi}{2} - \theta\right)$ is -1 b. 1 c. $\frac{1}{2}\sin 2\theta$ d. none of these

Watch Video Solution

184. Prove that: $\frac{\sin^2\pi}{18} + \frac{\sin^2\pi}{9} + \frac{\sin^2(7\pi)}{18} + \frac{\sin^2(4\pi)}{9} = 2$

Watch Video Solution

185. If $A = 2\sin^2\theta - \cos 2\theta$,the A lies in the interval

(a) $[-1, 3]$

(b) $[1, 2]$

(c) $[-2, 4]$

(d) none of these

Watch Video Solution

186. The value of $\cos^2\left(\frac{\pi}{6}+\theta\right) - \sin^2\left(\frac{\pi}{6}-\theta\right)$ is $a\frac{\dot{1}}{2}\cos 2\theta$ b. 0 c. $-\frac{1}{2}\cos 2\theta$ d. $\frac{1}{2}$

Watch Video Solution

187. The value of $\frac{\cos 3\theta}{2\cos 2\theta - 1}$ is equal to

(a)$\cos\theta$ (b) $\sin\theta$ (c) $\tan\theta$ (d) none of these

Watch Video Solution

188. The value of $\frac{2(\sin 2\theta + 2\cos^2\theta - 1)}{\cos\theta - \sin\theta - \cos 3\theta + \sin 3\theta}$ is $a \cdot \cos\theta$ b. $\sec\theta$ c. $\cos ec\theta$ d. $\sin\theta$

Watch Video Solution

189. $2(1 - 2\sin^2 7\theta)\sin 3\theta$ is equal to $a \cdot \sin 17\theta - \sin 11\theta$ b. $\sin 11\theta - \sin 17\theta$ c. $\cos 17\theta - \cos 11\theta$ d. $\cos 17\theta + \cos 11\theta$

Watch Video Solution

190. $\cos(36^\circ - A)\cos(36^\circ + A) + \cos(54^\circ + A)\cos(54^\circ - A) = \cos 2A$

Watch Video Solution

191. Prove that: $tan\theta \tan(60^0 - \theta)\tan(60^0 + \theta) = \tan 3\theta$.

Watch Video Solution

192. $\tan\theta + \tan\left(60^0 + \theta\right) + \tan\left(120^0 + \theta\right) = 3\tan 3\theta$

Watch Video Solution

193. $\frac{\sin(5\theta)}{\sin\theta}$ is equal to

$a.16\cos^4\theta - 12\cos^2\theta + 1,\ b.16\cos^4\theta + 12\cos^2\theta + 1,\ c.16\cos^4\theta - 12\cos^2\theta$

Watch Video Solution

Others

1. If $n = 1, 2, 3, ;$ *then* $\cos\alpha\cos 2\alpha\cos 4\alpha\cos 2^{n-1}\alpha$ is equal to $\frac{\sin 2n\alpha}{2n\sin\alpha}$ (b) $\frac{\sin 2^n\alpha}{2^n\sin 2^{n-1}\alpha}$ (c) $\frac{\sin 4^{n-1}\alpha}{4^{n-1}\sin\alpha}$ (d) $\frac{\sin 2^n\alpha}{2^n\sin\alpha}$

View Text Solution

2. $\tan 82\left(\frac{1}{2}\right)^{\circ} = (\sqrt{3}+\sqrt{2})\cdot(\sqrt{2}+1) = \sqrt{2}+\sqrt{3}+\sqrt{4}+\sqrt{6}$

View Text Solution

3. Prove that:

$$15\sin\left(5\frac{\pi}{12}\right)15\cos\left(5\frac{\pi}{12}\right) - 20\sin^3\left(5\frac{\pi}{12}\right) - 20\cos^3\left(5\frac{\pi}{12}\right) = 0$$

View Text Solution